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ABSTRACT

The staff of the Reading Project of the Learning Research and Development Center at the University of Pittsburgh, having previously experimented with beginning reading programs, adapted commercially available materials for use in an individualized elementary school environment. Their activities culminated in The New Primary Grades Reading System (NRS) designed for the first 3 years of reading instrution. Using a code-breaking approach to the linguistic materials, the program permits individual rates of progress through the 16 levels of the program, each of which contains 10 instructional sequences. NRS stimulates the "real-world reading situation" with such materials as workbooks, story books, games, and cassette-recorded lessons which fall into three categories: (1) "prescriptive"--teacher-controlled, (2) "selection"--limited student choice, and (3) "choice"--greater student freedom. (The four sections of the monograph present the rationale, theory, components, and design of NRS, as well as some examples of the decision-making processes of curriculum designers; a bibliography is also included.) (HS)

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THE RATIONALE AND DESIGN OF A PRIMARY GRADES READING SYSTEM FOR AN INDIVIDUALIZED CLASSROOM

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University of Pittsburgh

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INTRODUCTION

Both the importance of knowing how to read and the condition of reading literacy in the United States have been subjects of an enormous number of published reports and summaries. For example, in the past three years alone, 1,100 reading reports have been identified and abstracted in the annual summary of reading research (Weintraub, 1971). Nevertheless, reading literacy remains a problem in American society.

> --One out of every four students nationwide has significant reading deficiencies.
> --In large city school systems up to half of the students read below expectation.
> --There are more than three million illiterates in our adult population (Allen, 1969, p. 2).

These statistics are but a sample of a host of other equally grim statements which suggest the pervasiveness of this problem in American society. It is not the intent of this monograph to further discuss the importance of reading or the condition of reading. This monograph and the work it describes proceed from two premises: 1) that reading is a vital skill, and 2) that the condition of reading in the United States can be vastly improved. The bases for these premises have been considered carefully. However, since it is not our purpose to further discuss the importance or condition of reading, we will now proceed directly to the substance of this monograph.

The staff of the Reading Project of the Learning Research and Development Center (LRDC) at the University of Pittsburgh is presently committed to and involved in developing a new primary grades reading system that is aimed at improving the condition of reading.[1] The purpose

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[1] In addition to the authors, the staff presently involved in the development of this system includes: Marcia Brissett, Mitzi Cunningham, Margaret Horwitz, and Dorothy Walsh.

of this monograph is to give some background regarding the development of reading curricula at LRDC, and then to discuss in detail the rationale and design of this new reading system, presently known as The New Primary Grades Reading System (NRS).[2]

The monograph is divided into four sections. Section 1 deals with LRDC's past involvement in reading and the reasons for the development of a new system, and then presents the scope and a brief description of the system. Section 2 deals with the rationale and theoretical positions embodied in NRS. Section 3 describes the components of the system, and an attempt is made to show how the components have been developed concurrently. Section 4 deals with the design of the system through a discussion of some of the content. In addition, some examples of the weighing and balancing of decision implications that a curriculum designer must be concerned with are presented.

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[2] The name The New Primary Grades Reading System, which is used throughout this monograph, is only a preliminary working title.

SECTION 1

In 1970, after four years of research and testing, LRDC completed a beginning reading program known as Stepping Stones to Reading. This program is essentially a decoding program with heavy emphasis on phonics. A distinctive feature of the program is that each of eleven vowel phonemes is associated with a particular color, and the multiple graphemic representations of the vowel are printed in a single color. This permits the various visual representations of vowel sounds to be introduced to the child simultaneously. The Stepping Stones to Reading program was designed for introduction into the conventional classroom.[3]

LRDC has also been experimenting with beginning reading programs more suitable for an individualized school environment. The latter project has been involved with adapting commercially available materials for use in an individualized elementary school environment. A major effort of this project has been the adaptation and modification of a commercial phonic program. The commercial program consisted of workbooks, story books, and teacher's manuals. Modifications have included the insertion of cassette-recorded lessons and related response sheets, paperback stories for small-group instruction, and games and manipulables. A major addition was the creation of a totally new beginning portion, known as the Early Reading Program (ERP). This new portion was designed to teach children letter sounds and to provide instructional techniques for

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[3] The authors of Stepping Stones to Reading are Paul M. Kjeldergaard, Roselyn Frankenstein, and Robert Glaser. For a detailed description of the program, see Frankenstein (1971). An analysis of the data obtained in field testing the program is contained in Popp (1972, in press).

blending sounds into words. Management schemes were devised for this adapted system so that it could be individualized in terms of student rate. In addition to modification around the basic program, new components were added which enabled children to use various library and trade books.[4] During the last two years, particular emphasis has been placed on probing various instructional methods and strategies for beginning reading instruction.

The following data suggest that LRDC's continuous adjustment of commercial materials and its work with instructional strategies in beginning reading are having an impact on student performance.

Table 1 compares end-of-year reading achievement among three groups in an urban elementary school. The table shows results on the Reading Subtest of the Wide Range Achievement Test (WRAT) (Jastak, Bijou, & Jastak, 1965) in terms of mean grade equivalents. LRDC's program was introduced into the school one grade each year. Control groups were established by testing two grades ahead of the program as it moved up from grade to grade (Wang, 1970). Table 2 illustrates the general design. Since the children in the control and experimental groups are random samples from a common population,[5] Table 1 is useful in comparing changes that

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[4] For a more detailed description of the adaptations around the basic program and the additions of new components, see Beck (1970).

[5] "No significant differences in achievement were observed between controls of a given grade from year to year. Also, no differences were found on variables known to be related to achievement but which could not have been affected by the program, such as family socio-economic status. Therefore, it is reasonable to assume that from year to year, children at a given grade level were random samples from a common population (Cooley, 1971, p. 5)."

TABLE 1

Comparison of Reading Achievement (WRAT) After Two Years of LRDC Program in an Urban Elementary School

	Spring 1970	Spring 1971
First Grade	Experimental	Experimental
*Mean Grade Equivalent	1.8	2.4
Standard Deviation	.8	1.2
Sample Size	143	125
Percent Below Grade Level	61	36
*F = 25.11; ndf = 1 and 266; prob < .001		
Second Grade	Control	Experimental
*Mean Grade Equivalent	2.3	3.4
Standard Deviation	.8	1.9
Sample Size	110	114
Percent Below Grade Level	76	49
*F = 32.15; ndf = 1 and 222; prob < .001		
Third Grade	Control	Control
*Mean Grade Equivalent	3.4	3.2
Standard Deviation	1.3	1.4
Sample Size	98	89
Percent Below Grade Level	60	70
*F = 0.59; ndf = 1 and 185; NS		

TABLE 2

Experimental (E) and Control (C) Groups

	Grade				
Year	First	Second	Third	Fourth	Fifth
1968-69	C	C	--	--	--
1969-70	E	C	C	--	--
1970-71	E	E	C	C	--
1971-72	E	E	E	C	C

occurred after the introduction of the program, as well as changes resulting from program improvement (modification). Since no LRDC program had been introduced in the third grade by the spring of 1971, comparing 1970 third grade and 1971 third grade averages is one way of examining year to year fluctuations that occur within existing school programs. There was no improvement from 1970 to 1971 for third grade. A comparison of 1970 and 1971 second grade means indicates an increase of about one grade level when the LRDC program was introduced. The comparison of the experimental 1971 first grade group with the control group (1970 second grade) shows that first-graders are performing as well as second-graders were before the LRDC reading program began. The comparison between the experimental 1971 second grade group to the control 1970 third grade and the control 1971 third grade groups shows that second-graders in the LRDC curriculum are performing about as well as the third-graders without LRDC intervention. Finally, comparing first grade averages from 1970 to 1971 indicates the effect of improvements made after the first year's tryout of the LRDC program in 1970.

The preceding results are encouraging in that they show an increase in mean reading achievement for the population whose reading instruction was based on LRDC's adaptation of commercial materials and techniques. However, Table 1 also shows the percent of children scoring below grade level. Although an examination of these data indicates that the percentage scoring below grade level is being reduced through LRDC's efforts, those concerned with <u>each</u> child's achievement cannot be satisfied with these results. It is the position of the developers of NRS that the number of children reading at or above grade level on national norms can be greatly increased.

Judging from in-depth experience with adapting and manipulating commercial programs, NRS developers also believe that further adaptation of commercial materials would result in diminishing returns. The difficulty with adaptations of this kind is that the quality of the separate parts of the programs tends to be highly variable. For example, program X's graphemic progression may be logically sequenced and the reading material may be attractive and lively, but the program is written for group instruction and makes no provision for immediate remediation. On the other hand, program Y's instructional methods may be strong and there may be some provision for remediation, but the reading material is "dull" or there is no provision for any child to move ahead of the "highest" instructional group present in his class. Further, program Z may be organized for smooth classroom management and its content may be lively, but its instructional methods are weak. To some extent, the qualities of these programs can be equalized, but such an effort requires that a great deal of developmental time be spent in weaving discrete parts together. Although LRDC has been successful in strengthening some weak components in existing programs, the result is still an uneven system. Significant weakness in any one critical component of a classroom reading system greatly reduces the effect of other, better components.

In summary, our experiences with adapting, modifying, individualizing, and implementing commercial reading programs has led us to the conclusion that such experiences can best be integrated in the creation of a new system. It is the position of the designers of NRS that scientific and artistic attention to <u>each</u> aspect of a reading system is essential and

that each component must be considered in relation to the others every time a design decision is made. There is no way that the components can be in careful orchestration with each other if they are not so conceived.

Furthermore, it is not enough just to design and develop an interrelated system. Such a system must include effective implementation procedures, procedures that maximize the chances that every child is getting the best that the system can offer him.

Scope and Description of NRS

The New Primary Grades Reading System is oriented toward city children and covers what is traditionally considered the domain of the first three years of reading instruction. The purpose of the system, simply stated, is to teach the skill of reading effectively and efficiently.

The system is oriented toward city children precisely because of the statistical descriptions of the conditions of reading cited at the beginning of this monograph (Allen, 1969). By orientation, we mean that the subject matter of children's reading material, the concepts dealt with, and the refinement of instructional strategies have been conceived with particular consideration given to the urban child. Furthermore, the tryout and revisions of the program have taken place with populations of urban children and teachers. This, of course, does not mean that the system is not applicable to the rest of society. The program has also been tested with a suburban population. In addition, the adaptive aspect of NRS will increase its usability for different populations.

From its beginning, LRDC has been concerned with the nature and requirements of individualized instruction (Glaser, 1968). LRDC's

continuous experience with individualized instruction has provided techniques for dealing with the variability of student rates. This aspect of individualization is at least one ingredient that may account for the improved mean grade equivalent scores cited previously. From its inception, NRS has been designed for use in an individualized environment, and the model for individualizing student rate has been incorporated. However, LRDC's concern for individualizing instruction extends beyond student rate to the need for educational environments that are more responsive to "...the abilities and motivations that different learners bring to school...(Glaser, 1971, p. 12)." LRDC's aim has been to move from "selective educational modes" to more "adaptive educational modes."

In designing NRS, we, too, have been concerned with moving beyond individualization in terms of student rate to a more adaptive educational mode. Later in this monograph we will be describing aspects of NRS that include adapting instruction to the needs of individuals via alternative teaching strategies and opportunities for student self-direction. NRS is an adaptive system that permits children to progress at different rates, that allows for different routes to the mastery of objectives, and that provides for children doing different things at different times in the same classroom.

In order to provide a frame of reference for the rest of the monograph, we will describe the structural organization of NRS. The system is composed of sixteen levels,[6] each containing approximately ten instructional sequences. The term level was selected over such terms as

[6] Since detailed specifications for the final portions of the program have not been completed at this writing, the number of levels can only be estimated.

step, module, or unit to connote a horizontal as well as a vertical progression. In other words, every task the child performs is not designed to add new skills; some activities maintain skills or build fluency at the child's current reading placement, some allow him to read less demanding material, and some afford him the opportunity for "discovery learning" of upcoming content. The use of such levels, therefore, provides for some variety within a linear set of behavioral objectives. The instructional sequences, or groups of lessons, are composed of specific content geared to build a base of fundamental skills that a child must use as he progresses from one level to the next.

The scope of NRS requires a definition of reading in its broadest sense, that is, "the perception and comprehension of written messages in a manner paralleling that of the corresponding spoken messages (Carroll, 1964, p. 336)." NRS has as a terminal goal that a child upon exiting the program be able to read and demonstrate understanding of representative third grade reading selections. The term "representative third grade reading selections" points up just one of the problems in moving from a selective mode to an adaptive one. The problem remains for us to better establish what a child who has had approximately two and one-half years of reading instruction (typically an eight-and-a-half year old) can read and comprehend. We are working toward this new model of reading competency by examining both existing representative third grade material and existing third grade children.

In order to observe and measure whether students achieve the goals we define, a series of terminal objectives will be developed.[7] In an individualized system, some children may achieve the terminal goals in the middle of the second year, still others may not achieve them until the end of three and one-half years. The need, of course, is to provide situations that make the child and the teacher aware that learning is taking place. The aim is to build a system that allows for individual variation, but not for individual failure.

We will now deal with the scope, rationale, and theoretical positions that are embodied in NRS.

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[7] A first approximation of these objectives has been written. However, refinement of the objectives is currently underway; therefore, they are not available for inclusion here. In addition, Alan Lesgold, a Center research psychologist, is currently involved in experiments that are intended to test the ability of third grade students to understand a variety of inter-sentence references. It is expected that this work will be useful in establishing a model of difficulty and, therefore, in defining the domain of the terminal objectives.

SECTION 2

The broad definition of reading cited previously and NRS's terminal goal deal with the ability to get meaning from print. Meaning is, after all, the sine qua non of reading. The arguments surrounding the beginning reading controversies have seldom been over the terminal goal of teaching children to read; they have been over the means to that goal. NRS follows a "code-breaking" approach as the primary instructional means to that goal, as opposed to a "meaning" or "whole-word" approach. These two approaches (code-breaking versus whole-word) represent the major dichotomy in the teaching of reading. A brief description of these two approaches is necessary before discussing the reasons for using a code-breaking approach in NRS.

Basic Approaches to Reading Instruction

Whole-Word Approach

The whole-word approach, more popularly known as the "look-say" method, has been in vogue since the 1930's and has been openly challenged since the 1950's by a variety of code-breaking approaches. The whole-word approach, although it has many internal variations, most frequently begins with the teaching of whole words as meaningful units. High-frequency words are introduced in controlled settings, repeated, associated, and reinforced until they are learned. Association with pictures and understanding of words from their use in context stress the meaning aspect of the vocabulary from the beginning. A basic vocabulary of from fifty to two hundred words (depending on the specific program), called a "sight vocabulary," is established in this way. These words are then used as the set from which phonetic principles are extracted.

One underlying assumption of the whole-word approach is that the beginning reader must be engaged in behaviors similar to the mature reader, that is, reading for meaning, if the ultimate goal of reading is to be realized. Another underlying assumption is that the whole word is the easy unit and the phonemic elements of the word are the hard unit. The logic of this interpretation is that whole words have intrinsic value from the child's oral language, whereas phonemic elements must be given value through teaching. Therefore, both the teaching of phonics and the use of phonetic principles in unlocking new words take a deferred position. Within the whole-word approach, a child will typically be given the following order of prompts for reading an unknown word: 1) he will be instructed to read the rest of the sentence to see if he can figure out what the new word is (use context clues); 2) he will be told to look at the picture to see if that will help (use available meaning supports); and lastly, 3) he will be asked to think of other words that rhyme or begin with the same sound (use phonetic principles). This order of prompts indicates the deferred position that the use of phonetic principles holds in a whole-word approach to reading, and it also implies the type of phonics used.

In one representative basal reading program, the teacher's manual for the first reader describes a child who is using word-attack skills to read the new word clown as follows: The child thinks of words that begin with the cl blend and gets climb from which he takes the sound of the blend cl. Next, he examines the end of the word and observes that it ends like town. He puts the two pieces of information together and reads clown (Ginn, 1961, p. 21). It is our position that the amount of

reasoning that this child had to go through to read the word clown is unnecessarily complex, and the prompts which he had to invoke are unnecessarily distant from the task he needed to perform. As we will show in discussing NRS's word-attack approaches, this distance can be closed by providing the child with more direct prompts for unlocking a new word.

Research has indicated that children who have been taught to read with a whole-word approach have extrapolated qualities of the language that are generative and use them as their primary means when attacking a new word (Marchbanks & Levin, 1965; Valentine, 1913). Bishop (1964) found this phenomenon in a laboratory experiment with adults in which she studied the effect of pretraining in letter/sound correspondences on learning new words. She simulated the beginning reading experience by teaching the subjects to read some Arabic words. The eight Arabic words contained twelve letters for which there were perfect letter/sound correspondences. One group was taught a set of words through the whole-word approach. A second group was taught the letter/sound correspondences of the twelve letters. A third group received no training. When the three groups were compared in their ability to read a set of transfer words,[8] the letter-trained group performed best. But twelve of the twenty members of the word-trained group obtained scores similar to those of the letter-trained group. When asked how they read the words, some members of the word-trained group reported that they had tried to apply knowledge of letter/sound correspondences. The point is that they had extrapolated the letter/sound correspondences themselves (Bishop, 1964).

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[8] A transfer word is a word which was not used during instruction, but which contains the letter/sound correspondences that were taught and used in instructional words.

Adult learners are already aware of the alphabetic spelling qualities of language, and some subjects in this study made use of them in the experiment. Likewise, some children do indeed discover phonetic principles themselves and go on to become efficient readers. But in the statistics which were collected during the period when the whole-word was the most prevalent method being used in the schools, the fact remains that one out of four children still had a serious reading deficiency (Allen, 1969). We suspect that these might be the children who could not discover the generative principles themselves.

Code-Breaking Approaches

There are varied approaches to code-breaking. The two major code-breaking approaches, the phonic method and the linguistic method,[9] will be discussed here.

As was the case with the whole-word approach, there are many variations of phonic and linguistic methods, and some of the necessarily oversimplified descriptions we will use to characterize these two approaches will not apply to all phonic or linguistic programs. However, some basic distinctions between these two approaches will be presented so they can serve as a frame of reference for the discussion of the code-breaking strategies used in NRS.

Phonic Approach. The instructional strategies employed in phonic programs are generally characterized by the teaching of sounds (phonemes)

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[9] Linguistic here refers to structural linguistics, particularly the work of Leonard Bloomfield and Charles Barnhart (1961) and Charles C. Fries (1963) in relating sound and spelling. In addition, both Bloomfield and Fries developed reading programs. The more recent linguistic reading programs strongly reflect Bloomfield's and Fries' approach.

for letters (graphemes) which are then put together to form words. At first, the phonemes are limited so that there is a constant sound value for each grapheme. For example, the grapheme a will only receive one value, most often the short a phoneme, as in man. Limiting phoneme variability in words is one of the major differences between the whole-word and the phonic approaches. To reiterate, the whole-word approach draws its basic vocabulary from a set of high-frequency words. Therefore, such phoneme variability of the grapheme a as in sat, all, again, and may occurs in the first two units of the first reader in a whole-word approach (Ginn, 1961, p. 222).

In a phonic approach, phoneme variability is usually introduced by explicit rules. For example, after the students have spent some time working with the short a phoneme, they will be introduced to the long a phoneme as in the CVCE[10] word gate. To introduce the variability, this rule might be taught: In a one syllable word that ends with an e, the vowel is long and the final e is silent.

Some phonic programs compare and contrast long and short vowels early. Others introduce many isolated sounds, usually most of the short vowels and a string of consonants. Then, before combining the sounds into words, there is practice in combining them into VC and CV patterns (e.g., ep, ip, op; pe, pi, po). Still other programs introduce a few words and then extract phonemic elements from the words and present the appropriate rule. Regardless of the particular pr ,ram, most traditional phonic

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10 CVCE refers to the Consonant-Vowel-Consonant-silent E pattern in words such as rate, bite, etc. Likewise, VC and CV refer respectively to Vowel-Consonant and Consonant-Vowel patterns.

approaches have three common practices: 1) sooner or later there is practice on isolated letter/sound correspondences; 2) many explicit definitions of such terms as consonant, vowel, blend, etc., are presented; and 3) explicit pronunciation rules are taught. All of this is done under the name of "word-attack skills"; that is, the child will have knowledge of the rules of pronunciation so that when he encounters a printed word that he has never seen, he can apply the appropriate rules and pronounce that word.

Linguistic Approach. Adherents of the linguistic approach to reading are also concerned with word-attack skills and the control of phoneme variability. However, they are strongly opposed to two aspects of the phonic approach: the utterance of phonemes in isolation and the explicit presentation of rules. Their argument against teaching phonemes in isolation is that to do so distorts the sound stream. For example, the sound that represents the b in bat is not the sound that represents the b in bet. Their point is that a phoneme does not exist in isolation; it exists only in the environment of a word, or at minimum, in a spelling pattern.[11] The second aspect of disagreement deals with the emphasis on explicit rules that frequently characterizes the phonic approach. Those committed to a linguistic approach agree that rules need to be learned, but that, for the most part, they should be learned through examples and use (Bloomfield & Barnhart, 1961).

The linguistic approach attempts to teach both symbol/sound relationships and rules of pronunciation by sequencing and displaying texts

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[11] A spelling pattern is a combination of graphemes that has a specific pronunciation in the environment of the other letters in a word (e.g., at is /ăt/ in cat and catalogue).

so that the similarities and contrasts of major spelling patterns are made obvious. In the early stages of instruction, the linguistic approach commonly deals with word families (e.g., hat, cat, mat, sat, rat) and, in later stages, with word contrasts (e.g., hat, hot; ham, had; hat, hate).

The linguistic approach is similar to the whole-word method in that the smallest isolated language unit that is dealt with is the whole word. It is different from the whole-word method in selection and display of vocabulary. In the whole-word method, words are selected on the basis of their frequency in the language. In the linguistic approach, early words are limited to a single value for each grapheme and the words are displayed to maximize attention to spelling patterns; hence, man, tan, pan.

NRS Approaches to Reading Instruction

NRS follows a code-breaking approach to beginning reading instruction. However, the particular code-breaking strategies cannot be subsumed under one or the other of the major camps (phonic or linguistic). The decision of NRS designers to use a code-breaking approach is based on research findings and logical arguments, as well as our own successful experiences with code programs.

Research findings tend to support the position that beginning reading approaches that emphasize code-breaking strategies produce more good readers than meaning approaches (Bliesmer & Yarborough, 1965; Bond, 1966). Chall (1967) summarized eight early studies (1940 and before) of phonic versus "look-say" methods and concluded that "...an initial phonic approach...probably results in lower comprehension and rate at the

beginning of grade 1...but achieves better results in comprehension by the end of the second grade (p. 108)." We, too, suspect that this conclusion is correct. Clearly, it is an area of early reading that requires research.

In addition to research findings, there is a logical argument against the whole-word method. The whole-word method makes an alphabetic language like English more closely resemble a nonalphabetic language like Chinese in which every word has to be learned as a unit. It takes years to learn to read Chinese because there are few generative rules. Although English has some arbitrary and irregular aspects, it also has quite a few regular generative qualities that can be applied in figuring out unknown words. The many children who have learned to read English from the whole-word approach have induced the use of generative principles themselves. But, even the children who could induce generative principles themselves might have learned to read faster and more productively had the generative principles been more directly available to them. In addition, it is probable that many of those children who did not learn to read from the whole-word approach were unable to induce the principles that would help them to read unknown words.

Weber (1970) found by analyzing the errors of beginning readers that the majority of the errors were in the misreading of individual words, not in misinterpretation of meaning. In fact, these beginning readers showed a predisposition to use their knowledge of grammar to make passages meaningful. Since beginning readers appear predisposed to use semantic and syntactic clues to retain meaning, reading instruction which gives beginners strategies for using phonemic elements as cues to narrow down the semantic choice will be a powerful tool indeed.

In the conclusion to her study and analysis of existing research and approaches to beginning reading instruction, Chall (1967) recommends a changeover to code-breaking methods in beginning reading instruction. Furthermore, when a group of over 100 professionals in the field of children's learning were consulted in 1970 concerning the formation of a television reading curriculum, most of the consultants were in favor of a decoding through symbol/sound analysis approach to reading (Fowles, 1971). The point is that both the results of Chall's major study and the consensus of major contributors to the field of children's learning indicate that a shift to code-breaking approaches is occurring.

Indeed, many children will learn to read regardless of the method. It may well be that like "Emile," all they need is to receive an invitation to trigger reading behaviors. What such children need most is an adaptive environment, an environment that allows them to make creative use of their skills and to broaden their skills horizontally as well as vertically. The other child, the one in four who is not learning, and his peers who are learning, but just barely, are the ones who have swelled the number of underachievers to a level of national concern.

Underlying Assumptions and Working Hypotheses of NRS

Before we describe NRS's instructional approaches in detail, we will present the following underlying assumptions and working hypotheses regarding reading instruction. Some of these statements have already been dealt with; the remainder will be discussed and justified throughout this monograph.

1. Reading a meaningful unit, which is the last link in any behavioral analysis of reading, must be approximated very early in

beginning reading instruction, that is, within a few lessons. The earliest "meaningful units" in NRS are words that are a part of a child's oral/aural vocabulary. Early approximation of meaningful units more viable than words (e.g., phrases, sentences, paragraphs) is consistent with the rationale for early word reading. Therefore, in NRS, the learner reads his first word in the second lesson, his first phrase in the tenth lesson, and his first sentence in the twelfth lesson. The designers of NRS believe that this early approximation of "real-world" behavior provides intrinsic reinforcement to the child, in addition to the extrinsic reinforcement society gives for this behavior.

2. We have made a commitment to a code-breaking approach. However, decoding is not an end in itself. The ability to decode a word merely means that, given an unfamiliar word, one can bring into action implicit or explicit rules of pronunciation and pronounce the word. If the reader had to resort to decoding most of the words in this paper, he would have given up long ago. It would be too tiring and there would be no payoff. In order to gain information from print, a reader must be able to attack an occasional unfamiliar word, but, more importantly, he must have immediate recognition of most words so that his attention is on what is being communicated and not on how to pronounce the words. Therefore, though NRS is very concerned with establishing word-attack skills and does not assume that the beginning reader must be immediately engaged in activities similar to the accomplished reader, NRS is also concerned with the early building of a "recognition vocabulary" (that is, a reservoir of immediately recognizable words). Thus, after a new phonemic element has been learned, the child encounters words containing the new

element in print in natural context often enough to maximize the chances that the words will not need to be decoded but can be immediately recognized.

3. It is essential that beginning readers know when they have a word. Stated another way, when decoding, there is probably a covert step in which the decoder tries to match the sounds he has uttered with a known word. If the learner does not know the word, he does not know whether he is right or whether his approximation needs to be modified. Therefore, in NRS, pretraining will be given to assure that all words used in early lessons are in a child's oral/aural vocabulary. The pretraining will occur prior to the time the child is asked to read the word. Pretraining in oral/aural vocabulary will also serve to overcome the entering knowledge differences among students. Pretraining is one strategy for adapting to individual differences.

4. The following hypotheses concern the selection and sequencing of graphemes and graphemic units (see Appendix A for NRS's symbol/sound sequence):

a) Visually similar (b, p, d) and acoustically similar (v, f) stimuli should be introduced at a distance from each other.

b) Consideration should be given to the selection and ordering of graphemes in terms of the kind of words they generate. In other words, it is better to select graphemes that produce words that are in a six-year-old's vocabulary even though such a selection may result in fewer total words.

c) At first, only one phoneme should be presented for any one grapheme;[12] and additional phonemes should be introduced only after words containing the first phoneme are likely to be a part of the child's recognition vocabulary.[13]

5. Irregular function words should be introduced as they are needed. But, since these words cannot be decoded and must be learned as whole words, they could have the effect of diluting the beginning decoding skill. Therefore, such words should be introduced sparingly at first and the rate increased through the levels.

6. Initial instruction should be as concerned with teaching the child to follow instruction and to manage the system as it is with imparting the content.

7. Some "artistry" should be applied to the principles of programming so interest is maintained and the child doesn't drop-out out of boredom. In addition, some activities should be included for their aesthetic qualities.

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[12] Limiting the sound values of graphemes in initial reading has in the past been widely accepted by most code-breaking approaches. Levin and Watson (1963) and Venezky (1967) raise some questions regarding the value of limiting variability. However, Levin and Watson also state, "...we still would be reluctant to say that the total range of variation should be imposed on the beginning reader at the same time (p. 189)."

[13] NRS limits variability as described in text; however, two diacritical marks (an overline for the long a, i, o, and u and a slash for silent e; e.g., gāt/, rōp/) are used in order to permit in early texts a flexible and varied story line and still maintain a one-to-one symbol/sound correspondence.

NRS's Strategies for Code-Breaking

To say that NRS is in the code-breaking camp tells something about the overall approach, but not enough, as there are varied approaches and instructional strategies for code-breaking. We have chosen to characterize NRS's approach to code-breaking as an eclectic phonic approach based on linguistic principles. It is phonic because many grapheme/phoneme relationships are taught directly and practiced in isolation. It is an eclectic phonic approach because both synthetic phonics (building a word from its parts) and analytic phonics (exploring a word for a part or parts) are employed. It is based on linguistic principles because words and texts are frequently displayed to maximize similarities and contrasts in major spelling patterns and because there is minimum teaching of explicit pronunciation rules. The careful sequencing and display of words and texts should increase the chances that rules will be induced.

In NRS, one or a combination of the following language units are employed to teach word-attack skills: 1) symbol/sound correspondences, 2) similar spelling patterns, 3) contrasting spelling patterns, and 4) whole words. In this section we will present NRS's approach and the logical arguments that are the bases for its somewhat nonpurist characterization.

Synthetic Phonics. In the first lessons of NRS, children learn to produce the phonemes for m, t, s, hard c, and short a.[14] After the five grapheme/phoneme correspondences have been mastered, children are taught

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[14] A sequenced set of teaching steps has been designed for symbol/sound learning. This will be described in Section 3. In groups of five children, training time for the five graphemes ranges from fifteen to thirty minutes, with an average of twenty minutes.

through an explicit set of steps (the blending chain) to blend overtly the five known graphemes into real words (e.g., cat, act, mast).

This blending chain is an example of synthetic phonics. It is a specific strategy for putting sounds together to form words. The steps of the blending chain are described below:

The Blending Chain

> The NRS blending chain can be described in the following way: Let us assume that a child knew the sound correspondences for n, m, t, s, and short a and had been trained to perform the overt steps in the algorithm through the words cat and Sam. Mastery of the chain would be established if he performed (overtly blended) each step in the algorithm aloud for the words sat and ant (words that had not been used during instruction).
>
> When the word sat was presented, he would be required to:
>
> 1) Point to the s and say /s/;
>
> 2) Point to the a and say /ă/;
>
> 3) Slowly slide his finger under sa and say /să/ slowly;
>
> 4) Quickly slide his finger under sa and say /să/ quickly;
>
> 5) Point to the t and say /t/;
>
> 6) Slowly slide his finger under sat and say /săt/ slowly;
>
> 7) Circle the word with his finger and say, "The word is 'sat.'"

The need for a strategy to teach children to put sounds together has been observed by anyone who has seen the following kind of behavior: A child has learned the sounds for hard c, short a, and t; he then encounters for the first time the combination cat and reads, "/kuh/ /ah/ /tuh/; kitten." This child has learned letter/sound correspondences and he has learned that meaningful units emerge when sounds are put together; however, he has not learned how to put sounds together.

Traditional phonic programs have been quite successful in teaching many children symbol/sound correspondences; however, they have not been successful in teaching some children to put those sounds together. The problem is not that the instructional strategies used to teach children to put sounds together are not working. The problem is that there is a virtual absence of any instructional strategy. The teacher's manuals essentially tell the teacher to say something like: "Slide the sounds together." There is obvious inadequacy in this direction for many children. What is needed is a teaching algorithm for "slide the sounds together." The blending chain (described on page 25) is such an algorithm. The blending chain was added to the initial part of a commercial phonic program adapted for two LRDC-affiliated schools, tried out, and revised. To date it has been used with over four hundred children in actual classroom reading instruction. Most children have been able to learn the chain, and, even more importantly, have been able to use the steps to figure out new words. Also important is their eventual ability to "short-circuit" the steps, that is, to collapse three or four steps into one step and/or attack a new word covertly. Based on observations by LRDC staff members of hundreds of children and on analyses of classroom teachers' reports, the blending chain appears to be quite successful.

The strongest advantage of the blending chain is the precise information available to the teacher in terms of locating an error. If a child makes an error while performing the algorithm, the teacher knows exactly where the error is, that is, which link in the chain is incorrect. With this kind of precise information, the teacher can give him a direct prompt. For example, if the child's inability to pronounce a word was

caused by a substituted or omitted phoneme, the teacher would point to the letter and ask the child to say its sound. If he hesitated, she would prompt him with a silent mouthing cue. If necessary, she would model the sound. If the error was in a blend (e.g., the sa in sat), she would run her finger under the sa and ask the child to say the blend, she would cue the blend, or she would model the blend. The availability of precise information enables the teacher to adapt her behavior to the needs of the student.

By providing a model for isolating specific errors, the blending chain overcomes the problem of the indirectness of available prompts that characterizes the linguistic approach. Let us take an example from the linguistic approach of a child's first encounter with the combination sat and assume that prior to this encounter with sat, he had learned to read mat, fat, rat, and set. If the child did not begin to attack sat, the teacher would present set, ask the student to read the word, and then tell him that the new word begins like set. If the child misread at or did not attempt at, she would present mat, fat, and rat; ask the child to read the words; and then tell him that the new word ends like mat, fat, and rat. One difficulty with such a procedure is that the teacher often prompts the child in the absence of information that tells her where the problem is. For example, was the child's nonattack of sat because he didn't know the s phoneme or because he was looking ahead toward the at in sat and trying to figure it out? If the latter was the case, the teacher would have prompted the s unnecessarily. Indeed, she would have taken him away from the issue with which he was concerned.

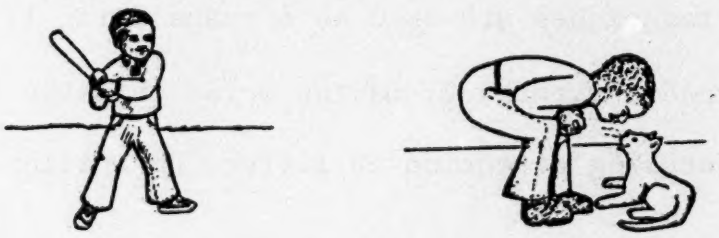
Some linguistic programs allow the production of a graphemic unit such as ot in isolation. However, none permits the uttering of an isolated letter sound. It is interesting to note an observation that Chall (1967) made while visiting English Infant School classes that were using a reading program that prohibited the utterance of isolated letter sounds: "...many of the teachers were teaching their pupils the sound values of the letters...even though the teacher's manual for this program says 'definitely no'....When I asked the teachers why they did it, they said it helped (p. 118)."

The linguists' concern that a phoneme does not exist except in the environment of a word is of little concern when a system is designed to rapidly put sounds learned in isolation into words children know. For example, a child who has a fair approximation of the sound values for b, short a, and t may produce somewhat impure sounds while blending those sounds into the word bat. However, with each step in the algorithm, he gets more information and refines the sound of b when he adds the a; when he gets to the step previously described as "a covert step in which the decoder tries to match the sound he has uttered with a known word," he modifies his somewhat impure combination to produce the correct word. We have seen many children perform this kind of refinement.

It should be pointed out that in NRS, five isolated symbol/sound correspondences is the largest set that a student ever learns at one time. This set of five isolated symbol/sound relationships occurs in the first lesson. As previously stated, when the first five are known, they are immediately used to blend real words. The next six symbol/sound correspondences are introduced one at a time. As soon as a new symbol/

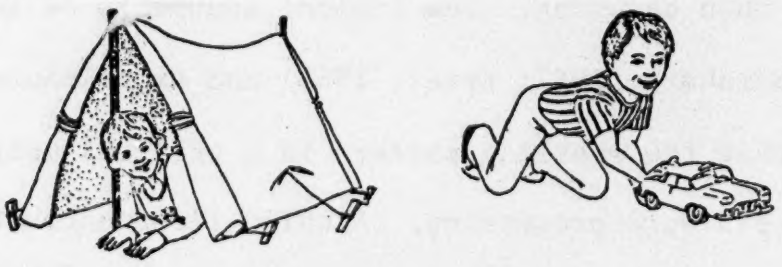
sound correspondence is learned, words that contain that new symbol are blended. Eleven symbol/sound correspondences are accumulated toward the end of Level I. At this point, most children indicate by performance on a criterion test that they have mastery of the blending process. When the child demonstrates such mastery, he is no longer required to perform the blending process overtly. When a child demonstrates control over the first eleven symbol/sound correspondences and the blending chain, the program broadens considerably. Utilizing words generated from the first eleven graphemes, a large number of phrases and sentences are generated so that words previously blended are encountered frequently in print. For example:

Given a sentence and two pictures, the child identifies (draws a ring around) the picture that matches the sentence.



Ben is at bat.

Given a series of pictures and a printed direction to color certain pictures, the child follows the directions.



Color Sam's tent.

The purpose of the kind of activities shown above is to move the words previously blended into the child's recognition vocabulary, and

thereby, have him discover that not all words have to be decoded since he "knows" many words.

At the beginning of Level II, attention is given to displaying texts in order to maximize similar spelling patterns. For example:

> Available words such as men, ten, and Ben are displayed and read in a column and included and read in a sentence.

1.

men

ten

Ben

"I see ten men," said Ben.

These techniques are not used for the purpose of introducing new phonemic elements. The techniques are used as a means for: 1) maintaining previously learned elements, 2) moving words into the recognition vocabulary, and 3) focusing attention on letter combinations larger than single graphemes.

The point of focusing attention on letter combinations larger than single graphemes brings up the question of the size of the graphemic unit an efficient reader uses when faced with the task of decoding a word; and then, what implications this has for the graphemic unit a child should be trained to use when decoding. The logical arguments of the linguists (Bloomfield & Barnhart, 1961; Fries, 1963) and experimental work (Gibson, 1969) suggest that the spelling pattern is a critical unit for efficient decoding and rapid word processing. A child first encountering the word mast who covertly or overtly approaches it as "/m/ /ăst/, mast" is obviously far ahead of the child who had to process mast as the blending chain would require, i.e., /m/ /ă/ /mă/ /s/ /măs/ /t/, mast.

In view of the above points, some justification is necessary for the requirement that NRS's precise blending process be learned. First of all, it is essential to point out that the blending chain is a teaching tool used only through the first twelve lessons of Level I. Furthermore, there is no evidence that a teaching algorithm has to match terminal behavior. Indeed, much of the literature on programmed instruction suggests that it is reasonable to engage a beginning learner in behaviors that are not totally comparable to the skilled performance. There are many examples of the acquisition of behavior which indicate that performance toward a terminal behavior often only approximates, but does not totally resemble, terminal behavior (Markle, 1969; Skinner, 1968; Taber, Glaser, & Schaefer, 1965).

Providing beginning readers with a precise algorithm has the advantage of enabling most children to attack new word combinations independently and successfully in the first week of instruction. Early independence and success has obvious value. But some will question whether the early payoff will turn into a later deficit; that is, since the spelling pattern is a critical unit for decoding, will early attention to units smaller than spelling patterns hamper or defer a child's ability to decode and process words by focusing on spelling patterns? In the absence of research evidence, we can rely on observations by LRDC staff of children who were initially trained through the algorithm. These children seem to be able to process new words using combinations larger than graphemes.

In the commercial phonic series used at two LRDC-affiliated schools, the typical child reaches the new word chicken approximately two months after the use of the algorithm has been stopped. Observation of certain

children at the time they reached this point revealed three examples of student behavior which was overt enough to record. Student A's eyes appeared to stop at chicken; he mouthed /chick/ /en/ and went on to the next word. Student B stopped at chicken; he put his pencil under the first part of chicken, clearly said /ch/ /i/ /chick/, then appeared to mouth /let/, then appeared to have looked at the /en/, and mouthed /chicken/. Student C appeared to mouth /check/, went back, put his finger under the first part and clearly said chicken. The three cases above are not presented as definitive evidence of how chicken was processed. However, from these examples and many other examples of listening to children read, it appears that children originally taught through the algorithm are processing words through units larger than graphemes.

To sum up the case for the algorithm: 1) by using the algorithm strategy for "sliding sounds together," most children are able to attack new combinations successfully; 2) the teacher receives precise information in terms of where to prompt a child; and 3) children short-circuit the steps and are not prevented from attending to spelling patterns.

Analytic Phonics. The blending algorithm is an example of synthetic phonics (i.e., building a word from its parts). But, since NRS borrows the best from available phonic techniques, analytic phonics (exploring a word for its parts) is also employed. Starting with Level II, analytic phonics is heavily used. For example, an early sequence in Level II includes the vowel combinations ee and ea. Toward the beginning of the instructional sequence, the combination ee is presented on a card and the

child is told, "The sound these letters make is /ē/."[15] He is then presented with printed words that contain ee (e.g., see, sheet, bee). Sometimes he hears the word, sometimes he's asked to read the word; then he is directed to draw a ring around the letters that make the /ē/ sound in the word. The same procedure is used for ea. Eventually, the child reads a sentence such as, "Ben sees the beans." He is told to locate the two words in the sentence that contain /ē/ sounds and then to mark the letters that produce the /ē/ sound in each word.

This example of analytic phonics does not imply anything different or new in terms of traditional uses of analytic techniques. The difference is that, in NRS, exploring a word for its parts is used when that technique seems appropriate to the task at hand. More specifically, the use of analytic phonics is helpful when the phonemic element under consideration is larger than a single letter.

Linguistic Approach. We stated previously that NRS is also based on structural linguistic principles because words and text are frequently displayed to maximize similarities and contrasts in major spelling patterns. In lesson 3 of Level II, children begin to work with word families. For example, they build words from patterns (e.g., eat--meat, seat, beat; an--fan, tan, can) and read the words by family organization. At various points in the program students work with contrast (e.g., pet, pot are presented, one of the words is heard, and the child matches the one heard with the corresponding printed word). Sometimes the student

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15 Consonant and vowel digraphs, some spelling patterns (e.g., or, all, ur, ar), and some morphemes (e.g., ing, es) are presented instructionally as a single grapheme would be presented. See the discussion of the symbol/sound teaching sequence in Section 3.

identifies a missing rhyming word (e.g., "The cat in the hall has a hat that is [till, tall]"). Children encounter texts that contrast short vowels (e.g., "I hid the nut in the net," said the big bug. "I had it under the rug," said the little bug. "Is the nut soft?" asked the little bug. "It is not."). They also encounter texts in which rhyming patterns are embedded in prose.

Selectively utilizing linguistic techniques provides children with another aid to reading acquisition and is consistent with the goal of NRS to provide varied strategies so that reading instruction can be adaptive.

The NRS approach to reading, then, is an eclectic one, based on decoding strategies. LRDC's experience in reading curriculum development suggests that this approach has demonstrated itself as a viable and pragmatic means for imparting the initial reading process. However, as anyone who has taught reading in a classroom knows, a good approach is a necessary but not a sufficient condition to produce success. We will now move into the discussion of NRS as a <u>system</u>.

SECTION 3

This section presents a description of the structure and organization of NRS. The roles of the student and teacher are discussed, and the components of the system are described. NRS is characterized as a reading system because of the interrelationships among the component parts and the integration of these parts into a management scheme. As the separate components are discussed, the implications for classroom management are indicated, since manageability (i.e., usability in a real classroom) must be an integral part of the development of any system.

Structure of NRS

NRS is described as an individualized-adaptive system. It is individualized in that it permits children to progress at various rates, it allows for different routes to the mastery of an objective, and it is organized so that a teacher can monitor a classroom of children doing different things at different times. It is adaptive in that alternative teaching strategies are available to meet the needs of different children and for the requirements of different tasks.

The general organizational structure of NRS is designed to facilitate management in an individualized-adaptive environment. It is arranged in levels containing a linear sequence of behaviorally described instructional objectives, plus a wide range of additional or "horizontal" activities. From the start, concerns about classroom management have influenced many decisions: the amount and kind of independent work designed, the response modes used at different levels, the kinds of games and manipulables developed, the structure and placing of criterion tests, and the type of training necessary for teachers.

In NRS, the presence of a variety of available materials and decision-making opportunities for which children do not need the teacher greatly facilitates the teacher's role in individualizing her classroom. More importantly, however, these materials and opportunities incorporate in the learning-to-read process the real-life situations of: 1) having to read sometimes and some things, 2) deciding to read either A or B, and 3) deciding to read or not to read. The first of these situations is termed prescriptive. In the prescriptive instance, the teacher determines and prescribes activities for the student. The second situation is termed selection. In this instance, the student determines his own prescription by selecting an activity from two possibilities. The third situation is termed choice. In this instance, the student makes a choice to perform any, all, or none of the activities that are available in the horizontal range of the level in which he is working.

A flow chart of one instructional sequence from Level VI is presented in Figure 1. A discussion of the activities and the movement of a student through the sequence will show how the three situations occur in NRS. This diagram indicates that the student begins the sequence with a cassette-led lesson designated A, follows with the correlated A-form workbook exercises, and then interacts with the teacher on a progress check. If his performance is satisfactory, the student leaves the prescriptive situation and selects his next activity from the two possibilities at his level. In the sample given in Figure 1, his choice is to read Story 2, a Creek Indian Legend, or Story 5, a collection of riddles. Both activities require the child to answer questions about what he chose to read. Both activities incorporate the new content

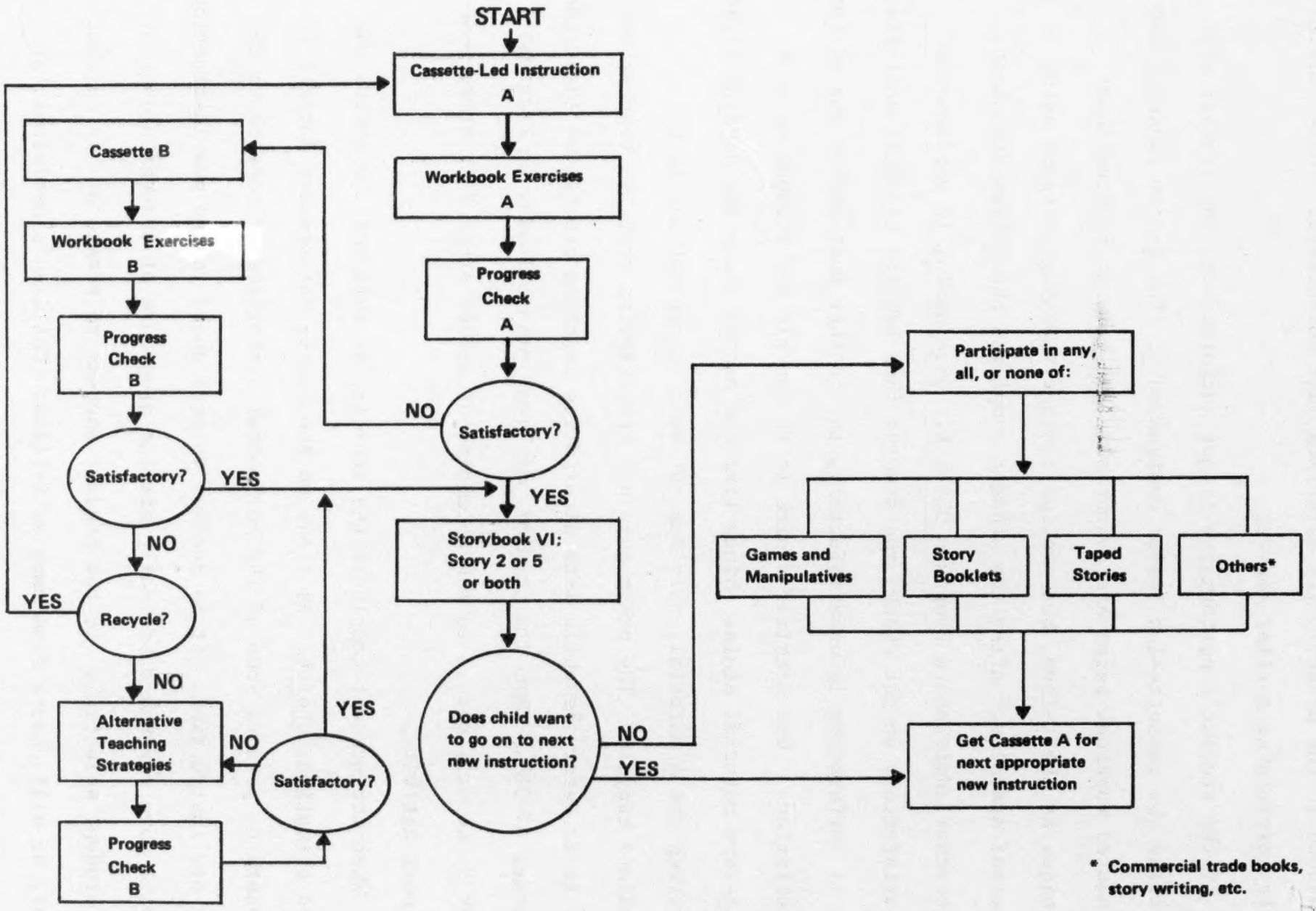

FIGURE 1: Flow Chart of the Instructional Sequence Described in Text

introduced in the prescriptive materials just encountered, while cumulatively maintaining earlier content.

If the student's performance is not satisfactory, the teacher will prescribe the cassette-led lesson designated B. The B-form cassette and correlated workbook pages are essentially the same in instructional technique as the A-form, but provide another teaching instance using different examples. After the student completes the B-form exercises, the teacher administers Progress Check B. Once again, if performance is satisfactory on the check, the student then selects his next activity. But, if performance is unsatisfactory, the teacher must choose one of two prescriptions. One possible choice is to recycle the student through the A-form material again. Since time has passed since the student first performed the A material, this may not seem as repetitious as an immediate recycle. The other possible prescription that the teacher may make is to enter the child into alternative teaching strategies (described on pages 47-50). When the student performs satisfactorily on Progress Check B, he will return to the selection of either Story 2 or Story 5 as his next activity.

When the student completes the activity he selected, he enters the third situation, choice. As shown on the chart, the student decides if he wants to perform some of the horizontal activities or move on to the next new instruction. If he decides to move ahead to the new instruction, he will move through a basically similar procedure of teacher prescription and student selection. If the student chooses to remain at his current level, he will choose from many activities. Children's decisions, at such points, help to determine how fast some children get through the

program. It may well be that one child exits later than another because he decided to do more things, not because he learned more slowly.

In the third situation, NRS provides varied materials and activities, giving the student the choice of doing one of them, some of them, all of them, or none of them. These activities include NRS-designed games, manipulables, story booklets, and correlated commercial trade books and taped stories. Unlike the teacher prescription and student selection activities that are arranged by sequence, the activities in the choice category are arranged by level. The games and stories in any level use all the instructional content up to and including that level. Therefore, since a child in any sequence in Level VI can use any game or book coded VI or below, "discovery learning" of upcoming content is possible. For example, the long o is introduced in sequence 7 of Level VI. A child in sequence 2 of Level VI could "learn" the long o through informal use of games and stories that include long o words. This sort of exposure to upcoming content may enable some children to pretest out of some instructional sequences.

The example given in Figure 1 has shown how the three reading situations combine in one instructional sequence. Similar opportunities for children to participate in the three situations occur throughout all levels of NRS. Levels I and II, however, utilize primarily the prescriptive route because, in the beginning stages of reading in NRS, concern is centered around the relationship between oral and written language. Teaching children to translate letters into sounds and words requires the use of oral responses, which then require confirmation. At this time, the teacher is the only one who can confirm oral responses, and, therefore, her prescriptive role in these beginning stages is crucial.

In recent years, particularly with the development of technological innovations in education, the goal of some educational programs is to be "teacher-proof." In contrast, NRS defines the role of the teacher as one of the major components of the total system. The teacher, therefore, is the primary vehicle for instruction during Levels I and II, and most activities during this period are of a prescriptive nature. Some games and correlated stories are available in these levels although the range broadens when the child enters Level III.

Once a child enters Level III, the cassette becomes the primary vehicle for presentation of new material. This can occur because oral responses are less necessary and because the child has acquired a set of basic skills which allows him to be less dependent on the teacher. The student selection and choice categories become more available as the child progresses through the rest of the levels. The presence of alternatives and choices assures that some decision-making and control opportunities are provided for the children. In the traditional basal reader reading programs, such opportunities are generally relegated to a list of "enrichment activities" at the end of the unit in the Teacher's Manual. Many busy teachers ignore them, and children end up with little or no opportunity to make choices.

In NRS, the goal is to allow the learner to add dimensions to his role as the reading process evolves. The learner is at the center of this process. His role is described below.

The Student in NRS

NRS attempts to design a student-centered environment. The student's role in the early levels may appear to be that of a passive receiver,

but, as will be shown, the student soon learns to be the active manager of his own progress.

NRS is a system that enables children to participate in a variety of activities without the teacher's constant direction. In order for students to proceed through tasks independently, a set of behaviors that can be described as "self-management skills" are required. In NRS, these self-management skills are introduced gradually by the teacher during the early portion of the program, Levels I and II, approximately 25 lessons. By the time the child reaches Level III, he has sampled each type of self-management skill that he will use throughout subsequent levels.

Self-management skills required in NRS include the following:[16]

1) Reading and following the prescription;

2) Identifying current assignments;

3) Deciding what materials are required;

4) Selecting appropriate materials;

5) Taking materials to an appropriate work space;

6) Setting up task;

7) Beginning work;

8) Working to completion of task;

9) If task requires teacher for evaluation, signaling her appropriately;

10) Identifying assignment on prescription and marking it complete;

---

16 Some of these skills were drawn from Procedures for the Individualized Classroom, Teacher Training Manual of the Primary Education Project (Reynolds & Leinhardt, 1970).

11) Putting all task materials back in proper place; and

12) Selecting next assignment and proceeding again.

Just as the skills of reading are taught in a gradual cumulative sequence, NRS is arranged to allow the child to acquire self-management skills in a gradual cumulative sequence. The student is also given opportunities to evaluate the choices that NRS offers him. For instance, in order for a child to be able to decide whether he wants to play a game, he needs to know something about it. Therefore, as various games become available, the teacher teaches the game and assigns the child to play it. Later, the game becomes an object of choice. To some extent, NRS follows the strategy of a mother who tells her youngster when a new food is presented, "You don't have to eat it all, but you have to taste it." In NRS, the child is required to "taste" the alternatives before he is free to select or reject them. The same is true for those positions in the program where a child can make a more important decision, such as whether to go on to the next instructional sequence or to stay in the current one. Before students can legitimately make such a choice, they must understand what the alternatives and the relative contingencies are of going on or stopping to "meander" at the horizontal level.

To facilitate the student's ability to perform self-management skills and make choices, the system must be developed around the student. For instance, if a student is to read a prescription and select materials, that prescription must be designed so that he can interpret it, and the materials must be organized and coded so that he can make the appropriate selection. If a student is to choose a game or a story, both must be designed in accordance with the student's level of skill development.

Throughout the remainder of this section, an attempt will be made to show how all aspects of NRS have been designed around the student.

The Teacher in NRS

The first two levels, approximately 25 lessons, are designed for teacher-led, small-group instruction, with provision for one-to-one teaching when needed. The teacher's role during these crucial early lessons has implications for the rest of the program when the child is much less dependent on the teacher. Four general areas come under the teacher's direction during the first levels: 1) reading strategies, 2) system mechanics, 3) system conventions, and 4) self-management skills. Each of these areas is discussed below.

Reading Strategies

The term reading strategies implies the skills needed by beginning readers to attack and get meaning from print. A discussion has been presented (Section 2) which justifies the decoding approaches employed in NRS. The term reading strategies also implies the instructional techniques used by teachers to impart those strategies. In this section, we will describe the teacher's role in selecting and using various teaching techniques to impart reading strategies.

In the following discussion, three strands of instructional techniques are described. The first is the major decoding strand, which was referred to in Section 2 of this monograph and which incorporates the techniques for teaching symbol/sound correspondences and the blending process. This strand is an explicitly defined program for the two fundamental skills of sounding and blending sounds. It has been our experience that this strand is effective with most of the children in our

project classes. However, a few children require either adaptations of this program or somewhat different approaches. For this reason, we have designed a second strand, referred to as alternative teaching strategies. This strand provides an adaptive quality to the teaching in NRS. It will also take the place of what has been referred to as "remedial reading" in traditional reading programs. The third strand is concerned with getting meaning from print. Each of these three strands is described below.

Major Decoding Strand. The two fundamental skills for beginning decoding are sounding and blending sounds. The techniques used by teachers to impart these strategies are as important as the strategies themselves. The techniques for teaching isolated letter sounds and the procedure for blending those sounds into words have been programmed into steps that guide the child from imitation of the teacher to independent performance. The training of teachers to teach the sound and blending procedures is especially important because of the fundamental nature of these two skills. Furthermore, when a teacher is well trained to teach these fundamental skills, she can provide a secure learning environment for the beginning learner.

In the NRS sequence for teaching sounds, teachers are trained to give simple, direct statements to children and to control the additional cueing or prompting that they employ so that they fade the prompts deliberately and systematically.

Techniques for teaching symbol/sound correspondences:[17]

1) The teacher models the isolated sound;

[17] This series of steps was developed, tested, and revised by LRDC staff members from 1969 until the present. LRDC personnel have trained approximately forty teachers and paraprofessionals in these two programs and have begun to develop the training programs necessary for implementation outside of LRDC-affiliated schools.

2) The children imitate the model;

3) The teacher models the sound again, this time associating the symbol (the letter on a printed card) with her verbal model;

4) The children imitate the model while associating the symbol with the sound;

5) Concurrent with the children's imitation at number 4, the teacher mouths the sound silently. In doing this, she consciously establishes a cue or prompt;

6) The children produce the symbol/sound correspondence without the model, but with the silent mouthing cue;

7) The teacher fades the silent mouthing cue as the children produce the symbol/sound correspondence; and

8) The children produce the symbol/sound correspondence independently.

This entire procedure actually takes only minutes. A lesson that introduces five new letters and includes a review of the set typically takes twenty minutes.

Compare the directness of the above with the indirectness and miscueing of the following procedure observed in a traditional classroom of an experienced teacher. The teacher held up a card with m printed on it and said, "This is an m. The name of the letter is m but the sound is /m/, as in 'mmmmountain.' I want to hear everyone say it." One child said m, two said /m/, another said "mmmmountain." The teacher said, "No, I want you to say the sound. Listen: /m/ as in 'mmmmountain,' 'mmmmother,' 'mmmmonkey.' Who can think of another /m/ word?" Hands went up. One child said, "'Mmary' like my name." Teacher: "Good, Mmary. Any others?" A second child said, "We went to the mountains once. It

was our vacation and we slept in a tent." With so many concepts floating about, only the most sophisticated child could extract the relevant information from the lesson. Training in the techniques of programmed teaching can enable a teacher to add greater precision to her "bag of tricks."

The example used above refers to an unsuccessful strategy for teaching symbol/sound correspondences, but similar examples could be given for sight words, spelling patterns, and blending. Regarding blending, one teacher observed by LRDC staff members spent so much time teaching the children to "run your slow train under these letters, and then run your fast train under them," that some children never picked up the idea that they were supposed to produce a slow blend and then a fast blend. Again, the indirectness of such teaching makes the child's job unnecessarily complicated.

The NRS procedure for teaching blending employs a sequence for linking sounds from left to right. The rationale for this procedure was discussed in Section 2. The techniques for teaching the procedure will be discussed here.

The blending procedure contains a series of steps that lead the child from imitating the procedure toward performing it independently. Essentially, the teacher repeats the linking and blending of sounds three times. At each repetition, the teacher fades out of the process and gives greater responsibility to the child. At the end of the sequence, the child demonstrates the procedure by himself.

Techniques for teaching the blending procedure:

1) The teacher models the blending procedure. She models the sounds and the blends and uses finger-pointing procedures and intermittent verbal directions.
2) The children imitate the model while the teacher repeats both the verbal cues and the finger cues to assist them.
3) The teacher repeats the procedure, but this time does not model the sounds or the blends. She gives only the verbal cues and the finger cues to assist.
4) The procedure is repeated. This time, the teacher drops the model of sounds, blends, and the verbal cues. She gives only finger cues.
5) The child performs the pointing, sounding, and blending steps independently.

One advantage of teaching from precise strategies is that teachers begin to focus in on a child's specific reading behavior. Instead of saying, "He just can't read a single word," teachers are more likely to say, "He knows the sounds and he can blend CVC words, but he can't get consonant blends." With the latter statement as a starting point, the teacher knows what she must concentrate on next.

Alternative Teaching Strategies. The alternative teaching strategies appear in Figure 1 as a tutorial loop that the student enters if the B-form materials and the recycling procedures have not brought him to a point where he can perform satisfactorily on the criterion measure. The example in Figure 1 is from a sequence in Level VI and shows a point at which a teacher may move into alternative teaching strategies for a

student who is well into the program. In this case, the alternative strategies would serve the role that is served by remediation in traditional reading programs.

The NRS approach to remediation differs considerably from the traditional use of the concept. Remediation traditionally has been intended for a student who is behind his expected reading achievement in terms of standardized test results. How far behind he must be before he is considered a candidate for remedial reading is variable. Often, help is not available until he is two years behind the expected achievement.

The content of traditional remedial reading programs is open-ended and very much dependent on teacher experience and preference. Game-like activities, "high-interest, low-vocabulary readers," and word-attack skill sheets are the most common components of remedial programs. Techniques, too, are varied and teacher-dependent. Most often, however, the techniques are a recapitulation of the techniques used in the regular developmental reading programs. The other extreme may also exist, that is, the teacher is highly trained in what are considered such esoteric techniques that they remain the province of special education or learning disability classes.

Remediation in NRS differs in many respects from what has just been described. In fact, NRS does not view the assistance it makes available to students who may be having difficulty as remediation. First, when a system is deliberately individualized with respect to student rate, a student cannot be classed as a remedial case if he is working at a different pace than his peers. Some students may be working at a slower

pace than others and yet may never enter the tutorial loop. Second, assistance is not delayed until the student is so far behind that he is sinking. At each criterion test point (the location of criterion tests is shown in Section 4), there is provision for assistance. A given student may not be at the same place on the achievement test as his peers, but he will certainly be performing the relevant reading behaviors for the level on which he is working. Finally, unlike traditional remedial reading programs, NRS never demands that teacher and student deal with the whole skill of reading at once. In other words, the student will never be sent to a remedial teacher with the directive, "This child doesn't know how to read." The use of alternative teaching strategies is determined from the student's lack of specific skills, and these skills are the content of the training that he will receive in his regular class with his regular teachers.

Although the alternative teaching strategies of NRS are now only in the design stage, NRS developers have probed various techniques. A preliminary description of the alternative approaches is given below.

There will be two major alternative teaching strategies. The first will be one-to-one teaching. For some children, the one-to-one teaching environment will be enough to bring them to criterion performance. In such a setting, the teacher will first try the same techniques that were used in the major strand. The teacher will then readminister the criterion measure. If the student's performance is satisfactory, the teacher will move him out of the alternative loop and into the next prescriptive sequence. If his performance on the criterion measure is not satisfactory, the student will remain in the alternative loop and the teacher will use the second alternative strategy.

The second major alternative resource will be comprised of teaching strategies that are different and/or not used in the instructional techniques of the major strand. For instance, if the student has difficulty in learning symbol/sound correspondences, the change will be from the present method of teaching the phoneme and then pairing it with the grapheme, to the opposite method of teaching the letter form and then associating the sound. Practice would be given in hearing the phoneme and identifying its grapheme before requiring the student to see the grapheme and produce its phoneme. If the student's problem occurs in blending words from individual sounds, the remedial techniques will call for shifting to the teaching of a set of whole words as sight words, extracting the phonemic elements, and then working backward to blending the word.

Throughout the development of the alternative component, NRS designers will capitalize on the experience of LRDC staff members who have had experience as reading clinicians and special education teachers. The techniques used in these fields, although they are specialized, are not so esoteric that they cannot be borrowed from the clinical environment, organized, sequenced, and put into the regular classroom. For example, the use of tactile reinforcement and sensory-motor training can be carried out by the classroom teacher if the techniques are made available.

The instructional strategies presented above in the major and alternative strands have concentrated primarily on decoding skills. However, during Levels I and II, the teacher also presents strategies that approximate the skills of the mature reader.

Meaning Cues. Mature readers are aided in obtaining meaning from print by making extensive use of semantic and syntactic cues. An example from NRS will show how the teacher initiates the strategies for employing such cues.

The children read their first story in the last lesson of Level I. At this point, the students have acquired eleven symbol/sound correspondences. This gives them a decoding vocabulary of approximately sixty words. Four sight words are also learned by the last lesson of Level I. The first story is a sequence of related sentences about three children and is supported with illustrations. It comes to a simple climactic ending. The story is presented in a teacher-directed lesson. During this lesson the teacher directs the children's attention to the meaning constraints of a sentence. For example, there is a picture of a tent on the first page of the story. The teacher tells the children to: "Read the sentence under the picture to find out who that tent belongs to." Thus, the teacher has set up a reading purpose that requires reading for meaning. In the instance above, the children read: "The tent is Sam's." Obviously, the teacher's question directed the children to one major element in this sentence, and that is the name Sam. In subsequent stories, the teacher will ask questions and set up reading purposes which direct the children's attention to larger meaning units as well as inferences. By the end of Level II, in another story, the teacher is directing children to read to: "Find out what Sam wants to do." This will require that children read a longer passage to get the answer. Thus, early in the instructional process, payoff for reading is sometimes placed on gaining information, that is, payoff is placed on a reading behavior that resembles a mature reading behavior.

There are other advantages to having these stories read and discussed under the guidance of the teacher. One is the oral language that can be used and exchanged between adult and child in extending the story concepts. Because beginning readers have limited decoding skills, there are limited concepts that can be put into written language. However, the typical six-year-old has a wide range of verbal knowledge that can be used to enrich his reading. Therefore, when in another story the children read: "Ben said, 'This is neat!,'" the teacher can ask the children to tell what Ben means when he says, "This is neat!" As children bring their verbal language ability to bear on such a passage, the meaning and the exclamatory nature of the passage are enriched. It has been our experience that once children discuss Ben's exclamation and tell all the things he meant when he said: "This is neat!," they return to read the passage with greater oral expression.

One more advantage of the oral reading and discussion under teacher guidance during Levels I and II is that the teacher can introduce samples of language conventions such as plural forms, possessives, and punctuation marks. The teacher's role in presenting these conventions is to demonstrate to children how to react to such conventions when they encounter them in print. For example, the first possessive form (Ben's bat) occurs in lesson 13 of Level I. The passage is read under teacher guidance. The teacher will call the children's attention to the apostrophe, she will tell them how to treat it when they read the word Ben's, and she will indicate what it means. But the teacher will not present elaborate rules around possessives or any other language convention. For the most part, children are taught only how to react when they encounter these conventions.

Techniques to be used by teachers are given explicitly in the instructional guides. The specification of techniques is important because it assures that new material is presented through sound instructional techniques. But, more importantly, when the teacher employs specific techniques, it is assured that the relationship between teacher-led instruction and cassette-led instruction is thoroughly developed. To illustrate how this consistency between teacher-led instruction and cassette-led instruction is developed, we will look at an example from the program. This example discusses the teaching of the irregular function words said and of. Such words are taught as whole words or sight words and are first introduced in the teacher-led lessons through Level II. As is the case with symbol/sound correspondences and various language conventions, the procedures that the teacher uses to introduce a sight word are essentially the same procedures used later in the program for a cassette-led introduction of a sight word. The teacher establishes and monitors the formats of presentation before the child is expected to follow those formats in cassette-led instruction. Following is the comparison of the teacher-led presentation of the sight word said in Level II with the cassette-led presentation of the sight word of in Level III.

In Level II, the teacher directs the children to a sentence in their workbooks that contains the word said. She tells them to point to and follow along as she reads the sentence. After she reads the sentence, she tells them that said is a new word. They are then directed to locate and underline said. The second time said appears, the teacher tells the children that the particular sentence includes said. They are directed

to locate said and then to read the sentence. The teacher then asks the children to select from two pictures the one that corresponds to a sentence that includes the word said. Toward the end of the lesson, said randomly appears in a variety of contexts. Finally, said is presented in isolation.

In Level III, the sight word of is similarly presented, but, here, the instructions are cassette-led. The cassette directs the child to follow along as the narrator reads a sentence. The narrator then tells the child that of is a new word and asks the child to point to of. Before the child is directed to underline the new word, the narrator asks the child if he is pointing to the second word. The narrator then prompts the marking response by saying: "Of is the second word; draw a line under the word of." When of appears in another sentence, the child is told that the word is in the sentence. He matches sentences including the word of with corresponding pictures, and eventually he is asked to respond to of when it is presented in isolation. The two examples point out the instructional consistency in the directions given by the teacher in teacher-led instruction and by the narrator in cassette-led instruction in the teaching of sight words: 1) the word is modeled; 2) the child is asked to locate the word; 3) the child reads the word in context; and 4) the child reads the word in isolation.

All of the foregoing examples come generally under the area of reading strategies which the teacher is primarily responsible for during Levels I and II. Certainly, the teacher continues to develop reading strategies beyond Level II, but having the teacher set down a wide base of reading skills makes it possible for cassette-led instruction to carry on much of the instruction beyond Level II.

System Mechanics

System mechanics refers to the operations and procedures with which the child must be familiar in order to proceed fairly independently through the system. For example, procedures for operating the cassette equipment are taught by the teacher in the second lesson. The students use the cassette equipment for practice and reinforcement of content presented by the teacher throughout Levels I and II. By the time children reach Level III, when instruction for new content is presented by the cassette, they have had sufficient practice in the operation of the equipment that the effect of its novelty has worn off, and problems they might encounter while using the equipment are solved.

The mechanics of NRS also include procedures for using workbooks and cassette response sheets. These procedures are presented within the content of the teacher-led lessons. For instance, the teacher calls the attention of her group to page numbers, frame designations, cassette codes, and other symbols used to identify and locate materials in the room and tasks within workbooks and reading books.

Finally, for the system to operate, the children learn to collaborate with the teacher in monitoring their own movement and progress beyond Level III. This is aided by a prescription sheet, which is introduced and monitored by the teacher toward the end of Level II. The prescription then becomes the child's guide to his own progress when he enters Level III.

System Conventions

System conventions are the arrangements of frames, the directions to children, and the types of responses children must make. In NRS, the

conventions are taught through the actual content. For example, an NRS program convention is to circle the picture that matches a printed word. Another example is to draw a line under the correct word from a set of words. These response conventions are taught by the teacher during the teacher-monitored workbook pages in Levels I and II. Thus, instead of putting children through a separate program of different content (many programs use pictures as the simplified content through which to teach conventions), the NRS guide for teachers calls for the teaching of necessary responses as children complete the teacher-monitored workbook pages.

Self-Management Skills

The necessary self-management skills which permit children to proceed through tasks without the teacher's constant guidance have been described on pages 41 and 42 of this section. This category is placed here again under the teacher's role to stress the point that, in NRS, the teacher helps the child acquire these behaviors before he is expected to use them.

Besides the behaviors that relate to the handling of tasks, there is another category of work behaviors which the teacher must establish and then maintain when the child enters the self-directed portions of the program. The other necessary work behaviors are content-related. Content-related behaviors require that the child use previously learned attack skills to decode a word instead of guessing at it, that he use context clues to help with the recognition and meaning of a new word, and that he employ other syntactic and semantic resources. We have shown how the teacher establishes these content-related behaviors in the discussion of reading strategies. To maintain these behaviors, the teacher has a

different role with the children who are in Level III and beyond. The new role becomes that of the "traveling teacher" (Reynolds, Light, & Mueller, 1971). The traveling teacher model was designed to meet the demands of a classroom in which children are performing a variety of different tasks at different levels of difficulty at the same time. The model enables the teacher to "travel" through such a situation, guiding, motivating, reinforcing, and tutoring. It is possible for a teacher to perform the role of Levels I and II as well as the role of "traveling teacher" simultaneously. The NRS training program will encompass both aspects of the teacher's role, that which is dominant during Levels I and II, and that which is dominant during Level III and beyond.

Major Components of NRS

Materials

In its final form, NRS will contain all of the materials necessary to carry on a developmental reading program. The materials used by children fall into two categories: 1) those that children use as a part of teacher- or cassette-led instruction, and 2) those used in independent activities as an extension of instruction or as part of pupil-initiated activities. Those materials used in instructional settings include the following:

Workbooks. Each child has his own consumable workbook for each level. The NRS workbook contains the response sheets that directly correspond to the instructional sequences. For example, in a teacher-led lesson in Level I, the teacher introduces the sight word color on a large card. But, students still need to read the word color in the print size and type font that will be used on workbook response sheets. And, teachers

need some provision for individual responses which will keep each child actively involved during instruction. Worksheets to meet these needs have been compiled into one workbook for each child. Each page is either teacher-monitored as an integral part of the instruction for a new element, or it is assigned for independent completion following instruction. One of the reasons for the decision to compile these response sheets into one workbook, instead of indicating prototype worksheets that the teacher could produce on ditto sheets, was to increase the chances that the response sheets would be used. Furthermore, response sheets in one workbook are far easier for teachers and students to manage than separate sheets. The cassette becomes the major vehicle for new instruction in Level III. At that point, the workbook contains the response pages for cassette-led instruction and the exercises for independent completion.

Blending Booklets. For the early teacher-led lessons, blending booklets have been devised. These are spiral-bound booklets containing sets of desk-sized pocket charts. Each pocket chart contains the individual letter cards for the words that will be used in the teaching session. For example, the first blending lesson uses the letter cards m, a, and t to teach the blending procedure for mat. Each child in the instructional group has a blending booklet with a pocket chart set with the letters m, a, and t. The student can slide the letters himself as he practices the blending procedure. These prearranged booklets free teachers from the task of sorting through stacks of letter cards prior to each lesson. The booklets are designed so as to prevent the letter cards from falling out of the pockets or from blowing off children's desks.

Reading Books. There are reading books for the teacher prescriptive, student selection, and choice categories. In the prescriptive category, children are sometimes required to read a specific story from these books in a teacher-led, small-group situation. At other times, they are required to read a specific story by themselves. The use of stories in the student selection category, as described earlier, is to allow children to select from alternative story forms. Stories which are used in the prescriptive and student selection categories are organized into books that correspond to the instructional sequences. These books take the place of the basal readers in traditional programs.

NRS reading books include a wide variety of content and style. Stories include personal interest type, fanciful, biographical, informative, current, historical, etc. Since NRS is oriented toward city children, personal interest stories (i.e., stories about children in real-life situations) have urban settings. The children in the stories more frequently live in apartment buildings than in single family dwellings. Baseball games occur in public parks or vacant lots rather than in spacious backyards. A variety of racial and ethnic backgrounds are represented among the story characters. Fanciful stories use animals or make-believe creatures as the main characters. Old legends are used to derive plots and characters. Informative stories deal with such varied topics as whales, quilting bees, sand dunes, and jazz.

As previously mentioned, stories in the choice category correspond to levels, rather than sequences. Children make their own choices of stories in this category. They are not required to answer questions about these stories as they are required to do in the prescriptive

category. It is planned that many and varied stories be available in the choice area. In the final product, NRS developers intend to make these reading books available in small paperbound editions of varying sizes and construction to more closely approximate "real-world" reading matter and to get away from the uniformity in size and book cover of traditional basal readers.

Independent Activities. This category of materials includes games and manipulables. Children can participate in these activities individually or with other children because the activities generally require little or no teacher direction. A child learns to play many of the word games with a limited number of letters and then adds more letters as he progresses. For example, games such as Lotto or Wordo can be played with ten letters or forty letters. Whenever a child enters a new level, he will have the content of that level available for Lotto and Wordo. The same principle is used with a variety of word blocks for sentence building. There are also card games in which the goal is the accumulation of pairs of words or sentences, and board games in which movement of a piece is dependent on the child's ability to read the directions. Manipulables include word wheels and picture/text matching puzzles. A simple printing device and various reference materials will be available.

Obviously, many of these games and manipulables are not new or unique, and many are currently available from commercial sources. However, the developers of NRS are unable to incorporate most commercially available materials because they are not tied to the NRS sequence. Most commercial materials purport to relate to all reading series. Therefore, the vocabulary will contain the high-frequency words of the "sight" programs as well

as the phonetically regular words of the phonic programs. In most cases, although the game or device may be very clever and enjoyable for children, the inability of the children to handle some of the vocabulary prevents them from using the material for practice and requires a lot of teacher direction. Although some of the ideas to be used in NRS games and manipulables may be adapted from commercial sources, classroom experience, and reading traditions, the content will be tied directly to the NRS instructional sequence. As a result, the difficulty of the content of each device can be increased gradually toward the higher levels of instruction.

There are many and varied possibilities for reading games. NRS will develop some, try them, and determine which are of lasting interest and which are most manageable. Games will be revised accordingly and others will be designed on the basis of what was learned. NRS developers are committed to making such game-like and open-ended activities available as a part of reading instruction.

Independent activities also include taped stories. A child can choose to listen to a story being read rather than to read a story himself. Taped stories often include a text that a child can follow as he listens.

All of the materials have been designed for instructional purposes, and all were included to contribute to the manageability of the system. Therefore, if any part of the materials component is left out, there will be a resultant sacrifice in manageability. Nevertheless, potential users of NRS will need to know if any materials can be eliminated because of their own time and money constraints. The final package will include such options with the specification of the loss in management flexibility.

Materials other than those used by children include instructional guides for teachers, testing materials, and nonconsumable materials such as large pocket charts and printed cards for use in small-group instruction. The final package will provide a vehicle for teacher training in specific aspects of the program. This will include video tapes and guides for pre-service and in-service use by teachers.

Cassette-Led Instruction

Cassette-led instruction is directly connected to teacher-led instruction and plays a large role in the total system. Children receiving cassette-led instruction (Levels III on up) can work independently much of the time. This allows the teacher to assume the traveling teacher role. The large cassette component in NRS is extremely useful in creating an individualized teaching environment. This component is one of the provisions which permits the children to progress at their own rates. When the child needs a specific instructional tool, it is available to him on cassette. Therefore, the child is not constrained to wait for an instructional group to be gathered before he can advance. Furthermore, the management aspects of cassette-led instruction greatly facilitate both teacher and student roles.

Testing

The testing component of NRS provides the teacher and the learner with a means of monitoring progress. The component consists of pretests, progress checks, and criterion tests. Pretesting can help identify the children who are able to skip an instructional sequence. Progress checks have already been described as a brief encounter between child and teacher in which the teacher assesses the child's handling of the content he has

just been taught in the instructional sequence. The teacher uses the progress checks to assist in making the next prescription. Criterion tests provide more definitive information about the student's mastery of larger chunks of content. Criterion tests also provide diagnostic information. From test results, teachers can determine specific weaknesses and select from the alternative teaching techniques that are available.

In designing the final testing component, we will be interested in answering several questions: 1) Where will tests be placed within the sequence? 2) How much time is required for testing, recording, and assessing results; and how will this time affect management considerations? 3) What are some alternative formats for testing that will maximize both student performance and diagnostic information? 4) What constitutes level mastery in reading skills that grow cumulatively over time?

In this section, we have outlined the structure and organization of NRS. We have described the components of the system, shown how the components are interrelated, and how management aspects have been incorporated into the individual components.

We will now turn to a discussion of the program design. Section 4 will focus on one instructional level and will describe the content of this level in some detail. This will serve as a means for describing the evolution of the design of NRS, distinguishing between levels, sequences within a level, and objectives within a sequence. This discussion will also serve as a means for sampling the instructional content of NRS.

SECTION 4

Section 4 focuses on one instructional level, Level III, and describes the content of that level in some detail. This detailed description allows discussion of some of the decision-making strategies and implications that comprise the most delicate and most exciting part of the job of curriculum design.

Content of Level III

Table 3 is a simple representation of the content of Level III. The content shown represents the prescriptive category only. As described earlier, the student selection category is tied to the content of the immediate prescriptive sequence, and the student choice category is developed from the content of the whole level. The prescriptive category is described because it represents the place where major curriculum design decisions are made.

Each arabic numeral in the first column of Table 3 represents an instructional sequence. The chart can be read across to view the content of any one sequence. Looking at sequence 8, for example, it can be determined that two elements comprise the sequence, the grapheme g and the sight word of. Sequences 1, 9, and 11 introduce only one element, a new symbol/sound correspondence. The content of instruction in sequence 4 consists of those spelling patterns listed in the third column.

We will now discuss the content of specific sequences and give examples of decisions made by the designers in formulating this content.

Symbol/Sound Correspondences

The selection of the specific symbol/sound correspondences to be taught and the ordering of these correspondences are major tasks in

TABLE 3: Content of Level III

Sequence	Symbol/Sound Correspondences	Sight Words	Spelling Patterns	Comprehension Formats	Stories	Tests
1	ch - chin					Progress Check
2	o - on		op, ot	Multiple choice with three alternatives		Progress Check
3	l - lap	and				Progress Check
4			et, it, ot, ap, ip, op			Criterion Test
5					Group Story	
6	r - ran	to				Progress Check
7			ell, ill	Follows printed directions		Progress Check
8	g - get	of				Progress Check
9	h - ham					Progress Check
10			ag, eg, og, ig			Criterion Test
11	or - for					Progress Check
12					Group Story	Criterion Test

designing a decoding-based reading system. In selecting and ordering the graphemes for NRS, two guidelines were employed with equal weight: 1) the ease with which the symbol/sound correspondence could be learned; and 2) the utility of a grapheme in conjunction with other graphemes in generating meaningful and/or picturable words.

The first guideline is the most obvious in a system that depends on the child learning symbol/sound correspondences and blending the sounds together. Some research has been reported in terms of the relative ease with which some letter sounds are learned. Coleman (1970) provided a rank ordering of thirty-five letters and letter combinations according to the ease with which their sounds were learned. He suggested that persons constructing a reading program be concerned with the first five through fifteen letter/sound correspondences from the ranking table because "...by starting a reading program with letter-sound associations that are easy to learn, one can reduce the effort of getting the child to the point that he can utilize phonics in deciphering unfamiliar words (Coleman, 1970, p. 13)."

We selected the first nine graphemes from Coleman's ranking to see if these data would help us. The first nine graphemes are given below with a word to illustrate the phoneme represented:

1. s as in see
2. i e as in ride
3. o e as in nose
4. z as in zoo
5. sh as in shut
6. o as in hot

7. ow as in how

8. m as in me

9. ue as in due

We then used these nine letter/sound associations to generate words. Words that can be generated from the given sounds include: size, sue, sow, muse, mom, mow, mime, and moss. Except for the word mom, there are very few words in the above list that can be quickly spotted as particularly meaningful, especially to a child.

The above example is given to illustrate that ease of learning symbol/sound correspondences is only one criterion for selecting and ordering a graphemic sequence. Equally important is that the graphemes selected enable the production of meaningful words, with particular relevance to the language of children. Implicit in NRS is the assumption that proficiency in the blending skill is not an end in itself. It is always the intention of NRS designers to approximate the goal of getting meaning from print. In order to approximate this goal, the criteria for graphemic selection and sequence must include consideration for the meaningful units that can be generated. Therefore, in ordering the graphemes for NRS, an "easy to learn" grapheme may be postponed because there is little payoff in its generative usefulness. On the other hand, a more difficult grapheme may be placed earlier in the sequence because it has higher payoff in word productivity.

Another concern in the matter of ordering graphemes was to separate widely, visually and acoustically competitive elements. This decision appears to be in conflict with some studies from paired-associate learning which suggest that learning is better when groups of stimuli are composed

of similar items rather than dissimilar items (Gagné, 1950; Rotberg & Woolman, 1963). Such studies, however, are not concerned with long-term learning and do not use the techniques of programming (i.e., shaping and stimuli presentation in gradual progression) to enhance learning. Also, such studies are concerned with learning short lists. The number of grapheme/phoneme correspondences that must be learned in order to read certainly constitutes a long list. Holland and Doran (1972, in press) suggest that some aspects of beginning reading can be classed as rote associations. They point out:

> The principal problem in learning rote associations is interference among new associations. Hence, the length of the list of items to be learned is a major consideration and similarity between stimuli and responses is a major variable leading to interferences among the elements. Spaced practice decreases such interference and hence becomes important when many rote associations must be learned.

The graphemes b, p, and d are visually and acoustically competitive, and there is evidence of their confusability (Gibson, Gibson, Pick, & Osser, 1962; Gibson, Osser, & Hammond, 1962). Therefore, in NRS, the b is twelve sequences away from the p, and the d is fourteen sequences away from the p. With this kind of progression, one element can be taught to high strength before the second one is introduced.

There is strong evidence that the letters b and d are the most difficult letter pairs to discriminate (Popp, 1964). This is the reason that the greatest distance among the three letters (b, p, d) falls between the b and d. NRS places the b before the d because when each grapheme, b and d, was considered in relation to the sequencing of other graphemes, it was found that introducing the b before the d was more productive--productive in the kind of words the b would generate in combination with

preceding graphemes, not in the number of words it would generate. In the first two levels, there was particular concern for generating words that could be pictured so that picture/word matching activities could be incorporated early. Introducing b instead of d in Level I produced more picturable words.

The productivity of the b before d decision is a positive implication. But, such decisions have implications for loss as well as for gain. In selecting one grapheme to precede another, we routinely considered whether any regular high-frequency function words were made unavailable through a graphemic postponement. In the case of presenting the b first, the only important high-frequency function word that would be made unavailable was and. The word and is a perfectly regular and decodable word if the student knows the phonemic elements. Thus, another factor had to be weighed. The word and is particularly important for building sentences with compound subjects and verbs. Such sentence structures would permit more variation and a closer approximation of natural syntax in the early lessons. Hence, the decision was made to introduce and as a sight word eight sequences before the introduction of the grapheme d.

Sight Words

In any decoding approach to reading, the designer must decide where to place the irregular, high-frequency function words. There is little argument that they have to be taught as whole words. Rather, the curriculum designers' decisions center around when to introduce them and the rate of their introduction. In making these decisions for NRS, two general rules were followed. The first was to include such words in a sequence when they could be used in context, since the sentence context

is the strongest means for supporting such words. The second was to include such words when they became necessary to generate a new sentence structure.

Referring again to Table 3, the column headed Sight Words shows that three words are introduced as sight words in this level. The first sight word, and, occurring in sequence 3, is not an irregular word. The reason for its placement here has already been given. The other two sight words in this level are to and of. There were good reasons for choosing these particular irregular, high frequency function words. The rationale provides a good example of the variety of considerations made in establishing this content design. For instance, in sequence 6, the content consists of the symbol/sound correspondence for r and the sight word to. As soon as the symbol/sound correspondence for r is taught, the strong action verb ran becomes available. In order to get the maximum impact of this verb, combined with the already available vocabulary words, the word to is necessary so that frames such as ran to the tent and ran to the cab can be generated. Thus, sequence 6 of Level III becomes the natural place to introduce the sight word to.

The other high-frequency irregular word included in Level III is of in sequence 8. Given its utility for building sentences, it is obvious why the word of is needed early. The curriculum developers' need to look at implications of decisions is illustrated by the positioning of of in the same sequence as the grapheme g. To illustrate, the simplest use of of is in sentences in which there is a container of something. Therefore, to introduce of, there is need for a strong noun that is a container and other strong nouns that can be things in the container. The introduction

of g generates the word bag. In conjunction with the g sequence, of can be used in a number of natural language situations, such as a bag of beans and a crate of eggs. The amount of instructional time needed to establish of as a sight word will probably be less than it would be if of was introduced when there were fewer instances of natural context.

Spelling Patterns

Spelling patterns are used in NRS to support graphemic elements and to exemplify similar and contrasting spelling patterns. Both uses will be illustrated through a discussion of sequences 1 through 4 of Level III. The content of these four sequences is shown below for easy reference.

Sequence	Symbol/Sound Correspondences	Sight Words	Spelling Patterns
1	ch - chin		
2	o - on		op, ot
3	l - lap	and	
4			et, it, ot, ap, ip, op

The o in sequence 2 is the fourth short vowel to be introduced in NRS. It is preceded by short a, e, and i. Instructional strategies for introducing the short o include the pairing of the letter o and its phoneme; the presentation of short o in a series of nonpatterned words such as on, moss, pot, and soft; and working with o words in sentences. Once the short o has been emphasized as an isolated sound and in a diverse set of words, it is presented in patterns. The words mop, stop, and pop, as well as cot, pot, and not, are displayed in such a way as to emphasize the

rhyming patterns. In this way, the pattern format supports the teaching of the new graphemic element short o.

Sequence 4 contains no new elements. The words that will be used in sequence 4 are all words that were generated and decoded by pupils during sequences 1 through 3. These words are now grouped together and are displayed as similar spelling patterns to support and maintain the elements of previous sequences. For example, chap and lap, as well as chip and lip, support the newly learned ch and the l. Likewise, top, chop, and mop support the short o. In this same sequence, spelling patterns are also displayed to exemplify contrasting vowel patterns. These include: let, lit, lot; map, mop; last, list, lost.

As indicated earlier in this discussion, formal attention to the contrasts between short o, i, e, and a patterns does not immediately follow the short o sequence. The intention of the programming techniques in this instance is to concentrate on just the short o, and to get it well established in a variety of circumstances before contrasting it with other vowels.

Comprehension Formats

Comprehension formats refers to new combinations and presentation schemes, and the types of student responses required. Comprehension formats are so named because the responses required can only be made if the child has read and "understood" some of the printed material.

In Levels I and II, the teacher is responsible for introducing each new frame arrangement. For example, she teaches the child that when he encounters a picture and two sentences, he has to read both sentences and then circle the sentence that "tells" about the picture. A variety of

frame arrangements are introduced by the teacher through Level II. Although many of these frame types are continued throughout the program, new frame arrangements are introduced in succeeding positions. The two new comprehension formats shown in the fifth column of Table 3 are discussed below.

The first new comprehension format in Level III is found at sequence 2 and is described as "multiple choice with three alternatives." This format has been used by students prior to this point. For example, they have been required to select from two words the word that matches a picture; from two pictures the picture that corresponds with a sentence; and, from two sentences the sentence that corresponds with a picture. The obvious advantage of having the student discriminate among three instead of two alternatives is that the chances of guessing are reduced, and the probability that the student needs to read all the material is increased. In sequence 2, the cassette is used to take the student through some samples of frames that contain three alternatives. After this sequence, the student will find some three-alternative frames in his independent work.

The second new comprehension format is found in sequence 7 and is referred to as "follows printed directions." Following printed directions is a strand of tasks that begins in Level I and continues through the program. The first instance of this format consists of two pictures with a printed direction to color one of the pictures; for example, pictures of a bat and a cat with the printed direction: "Color the cat." The same format shows a higher level of sophistication in Level II where the child is directed to: "Color the cat that is on the mat." As color words are generated, frames such as "Color Ben's hat blue" become available.

The particular format that is introduced in sequence 7 is concerned with teaching the student to read and follow directions that tell him to make an X on part(s) of a picture. After the response is learned in sequence 7, the child encounters this format in his independent work. An example that occurs early in NRS is a picture of a rabbit and a cat with the directions: "Make an X on the rabbit." An example that occurs later in NRS consists of a picture of a cartoon rabbit and a cartoon chimp both wearing caps and looking at two robins, one of which is in a nest. Under the picture are the directions: "Make an X on the rabbit's cap. Make an X on the robin in the nest."

Stories

The story category ranges from the first short story the students read under teacher direction through those that are read independently. Table 3 shows only the group story format, which we will examine in detail here.

A group story is one that is read and discussed by a small group of children in a teacher-led situation. By Level III, the children are independently reading paragraphs in their workbooks. By Level IV, they will be reading stories independently. Yet, the group story format will continue throughout the program to provide the child with two sources of stimulation that a child reading a story by himself does not have: 1) the teacher, and 2) other children who are reading the same story at the same time.

Starting with Level III, the cassette becomes the primary vehicle for new instruction. Once the child enters Level III, he often works independently, interacting with the materials. The child is in frequent

short-term contact with the teacher when he receives his prescription, when he takes a test, and when the teacher stops during her "traveling" role to reinforce and tutor briefly. Children, of course, are in touch with each other in many informal ways, when they get materials and as they compare what they are doing. They are in touch with each other especially in the "choice" area where some games are purposely designed for more than one child to play. The group story situation adds yet another environment for more sustained peer contact and student-teacher contact. This situation would be beneficial if it was based on social reasons alone. However, strong instructional benefits exist in small-group, teacher-led environments also.

In order to show how the social and instructional benefits are combined in group stories, it is necessary to describe the classroom management arrangements. Starting with Level III, children will begin to spread out more in terms of their rate through the sequences. Some will pretest out of sequences, and some will just go faster than others through the same sequences. Our experience with individualization of rate shows that the spread becomes greater as the children progress through the higher levels. The problem of how to "collect" a group of children in such an environment arises. Starting with Level III, NRS places a group story toward the middle of each level and another at the end of each level. Table 3 shows that Level III presents a group story at sequence 5 and another at sequence 12. It is estimated that it will take the typical child about two weeks (forty-five minutes a day) to go from sequence 4 through sequence 11. Sequence 4 is a prerequisite for sequence 5, the group story. However, the group story is not a prerequisite for

sequences 6 through 11, but it is a prerequisite for the first sequence of Level IV. Therefore, the story must be read before sequence 1 of Level IV. We have explored such a management scheme and have found that we have been able to "collect" enough children for a small group.

As was discussed in Section 3, there are some areas in which the program "shares" the responsibility for teaching with the teacher. In the small-group story situation, the teacher is the instructor in the areas of: 1) increasingly complex syntax, 2) polysyllabic words, 3) contractions, 4) punctuation, and 5) familiarizing the reader with concepts he will be reading about. Examples from these five areas are discussed below.

1) The first reading of a new sentence structure is often found in the group story. The teacher is not instructed to teach a new structure explicitly, but she is available to model the new structure, and to ask a question that will require the child to read a new structure aloud. There is much evidence that young children have aural and oral control over a large portion of the grammatical system. In initial reading the text material is necessarily confined to simple structures. NRS slowly increases the complexity of sentence structure under the guidance of the teacher. The teacher's role is to assist in transferring the children's oral/aural knowledge of structure to printed language. When a story contains a new sentence structure, that structure then continues to appear in the printed material that the child works with independently. By requesting the child to read and hear what is new to him in print, the teacher implicitly reminds him that it is not a new language structure.

2) The rationale and strategy of having new sentence structures appear first in the group story is the same rationale and strategy that pertains to polysyllabic words. Polysyllabic words appear frequently in a young child's speech. The teacher's availability to model polysyllabic words implicitly reminds the child that he has them under control and aids in transferring that control to print.

3) Similarly, contractions are very natural in a child's spoken language. Therefore, they are used frequently in NRS reading material. Contractions are first placed in a group story because they seem to fall more naturally into the conversational patterns of the stories. As soon as a contraction can be generated, the very next group story will include the contraction. For example, when the child can read I am, the next group story will include the contraction I'm. If a child has difficulty, the teacher is not to belabor the grammatical functions of the apostrophe. She is simply to point out that I'm is just a short way of saying I am. The Teacher's Manual suggests the above statement and reminds the teacher that beginning reading should not include elaborate explanations of the grammatical functions of the apostrophe or other such marks.

4) Punctuation is dealt with in the same way. NRS uses standard punctuation. A new mark appears first in a group story. With the exclamation mark, for instance, the Teacher's Manual suggests that the teacher say: "That's a new end-of-sentence mark. It's just like the period; it tells you where a sentence ends. It's called an exclamation point and it means that an exciting sentence is ended." Again, the teacher is reminded not to belabor the functions of the mark.

5) The last specific instructional area the teacher shares with the program is that of familiarizing the reader with concepts that will occur

in upcoming reading material. The child who is just learning to read should not have to learn new concepts from reading. In other words, a beginning reader should be familiar with and have some background preparation for what he will be reading. In order to assure that the beginning reading materials are varied and interesting, and that beginning readers have the background to handle some new ideas, such ideas are introduced through a teacher-led group story. A good example is the group story in Level III, sequence 5. It is estimated that the typical child will encounter the story after approximately two and one-half months of instruction. The story is about a seal who is hunting for fish. He is about to accomplish his aim, but he is frightened by a passing ship. The fish gets away and the story ends as it began: the seal is hunting for fish. In order to read that story "meaningfully," the child should know what a seal is, where seals are found, and what seals eat. Although many children will know about seals, their habitat, and food, some will not. Before reading that story, the teacher can determine what is known and briefly fill in or elicit the rest of the information from others in the group who know about seals. It is important to point out that in-depth background and elaborate familiarization is not intended. Yet, by the same token, beginning readers have enough to do without reading about things they have never heard about.

Some prefamiliarization of reading topics is carried out by cassette at various points in the program. However, the child can select <u>not</u> to listen to the tape if it is unnecessary for him. For example, in Level VI, the long <u>u</u> is introduced and the word <u>dunes</u> is generated. It was desirable for youngsters to be able to read about sand dunes, a subject many city

children are not acquainted with, yet quite an interesting topic. Therefore, an audio-tape with some visual material that familiarizes the child with the subject will be available. The child may choose to listen to the tape before the story, or he may choose not to listen to the tape and go right to the reading selection. This kind of audio material gives the child a frame of reference only. It does not take him through the reading selection on sand dunes.

Other selections use audio assistance for difficult vocabulary. Sometimes the topic generates low-frequency specialized vocabulary. In these cases, the child is told that the material he is to read contains some unusual or difficult words, and that a particular audio-tape is available for assistance with this vocabulary. Again, he has the choice to listen or not.

Tests

The positions of progress checks and criterion tests in Level III are shown in Table 3. The progress check has been described as a place for the teacher to conduct a brief spot check. The progress check following sequence 1, for example, requires the child to read a few short ch words to the teacher. The ch was, of course, the new element in this sequence. The child's performance on this progress check determines whether or not the teacher will prescribe the B-form materials. There is another progress check at the end of sequence 2. The content of this check will only include the new element o. Similarly, the student must read a few l words and the sight word and before exiting sequence 3.

A criterion test that provides more in-depth information than a progress check is placed after sequence 4. It covers the content in the

first three sequences (i.e., the consonant digraph ch, the short o, the l, and the sight word and). The criterion tests in the various levels help the teacher determine if something more intensive than recycling is necessary, such as turning to alternative teaching strategies.

Section 4 has dealt with the design of NRS through a discussion of the content of one of the many levels. This step-by-step description was intended to point out the many variables curriculum developers must deal with when designing an instructional system, and to sample how they are handled in NRS. It has been shown that multiple considerations are necessary when the goal is to create an integrated manageable system.

GENERAL SUMMARY

The purpose of this paper has been to describe the design and rationale of The New Primary Grades Reading System under development by the staff of the Reading Project. The need for a new reading system has been determined by evaluating LRDC's present reading programs, which are comprised primarily of adaptations of commercial programs. Although the results of these programs are encouraging, developers believe that continuing such endeavors will have diminishing returns. The NRS design recognizes the enormous importance of the interrelationship of each and every component of an instructional system. In order to achieve this interrelationship, the components of the new reading system have been designed concurrently. Its classroom management aspects are an integral part of the system.

NRS is an individualized system that permits children to progress at various rates, allows for different routes to the mastery of an objective, and is organized so that a teacher can monitor a classroom of children doing different things at different times. The system is adaptive to the needs of individuals via alternative teaching strategies and opportunities for student self-direction. The system has been designed to encompass the domain traditionally covered by the first three years of reading instruction. NRS is oriented toward urban children. It is expected that children will be able to read and demonstrate an understanding of representative third grade selections upon leaving the program.

NRS uses a code-breaking approach to beginning reading. Its approach to code-breaking is an eclectic phonic approach based on linguistic principles. It is phonic because many grapheme/phoneme relationships are

taught directly and practiced in isolation. It is eclectic phonic because both synthetic phonics and analytic phonics are employed. It is based on linguistic principles because words and texts are frequently displayed to maximize similarities and contrasts in major spelling patterns and because the teaching of explicit rules is kept at a minimum. There is also a strong commitment to having reading materials approximate natural syntax and structure as nearly as possible. This is related to NRS's instructional strategies which are based on the assumption that the reading of meaningful units must be approximated early in instruction.

In NRS, word-attack skills are taught through symbol/sound correspondences, similar spelling patterns, contrasting spelling patterns, and whole words. The blending of symbol/sound correspondences is taught through a specifically designed algorithm that has been proven successful in LRDC-affiliated schools. Mastery of this algorithm allows most children to attack new word combinations independently and successfully in the first week of instruction.

NRS is arranged in levels, a term chosen to connote both a horizontal as well as a vertical progression. There are approximately sixteen levels, each containing about ten instructional sequences. To enable children to engage in reading situations that resemble real-world reading situations, NRS designers have developed three categories of materials to support these situations. The first, the prescriptive category, is essentially controlled by the teacher. The second, the student selection category, affords the student the opportunity to select activity A or activity B. And the third, the choice category, which is arranged by level rather than by sequence, allows the child to choose from a variety of materials and activities.

The student's role, the teacher's role, and the components of NRS have all been conceived with special attention to classroom management.

NRS has been designed and formulated from the experiences and research findings of the LRDC staff. Many of the components of the system still require further research, development, and revision. What has been set down here is a base from which to continue working, and there is much work yet to be done.

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APPENDIX A

Symbol/Sound Sequence		
1. a (at)	22. or (for)	43. z
2. m	23. all (ball)	44. y (try)
3. t	24. d	45. ew (dew)
4. s (sat)	25. k	46. ir (sir)
5. c (cat)	26. u (sun)	47. ay (day)
6. sh	27. w	48. ur (fur)
7. n	28. i (kite)	49. oa (boat)
8. e (net)	29. ar (car)	50. ow (low)
9. b	30. y (yarn)	51. c (cent)
10. a e (name)	31. o (rope)	52. aw (saw)
11. f	32. er (her)	53. g (giraffe)
12. ee	33. wh	54. oy (boy)
13. ea	34. y (happy)	55. oi (join)
14. i (sit)	35. u (mule)	56. ph
15. p	36. j	57. oo (room)
16. ch	37. v	58. ow (cow)
17. o (pot)	38. qu	59. kn (knee)
18. l	39. oo (book)	60. au (taught)
19. r	40. x	61. ou (fought)
20. g	41. ai (rain)	
21. h	42. th	